

REPORT DOCUMENTATION PAGE**Form Approved**
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) xx-03-2010		2. REPORT TYPE Master of Military Studies Research Paper		3. DATES COVERED (From - To) September 2009 - April 2010	
4. TITLE AND SUBTITLE Human Electro-Muscular Incapacitation (HEMI) Use in the Military/ Applicability Across the Full Spectrum of Operations				5a. CONTRACT NUMBER N/A	
				5b. GRANT NUMBER N/A	
				5c. PROGRAM ELEMENT NUMBER N/A	
6. AUTHOR(S) Schlussel, Damian, Maj, USAF				5d. PROJECT NUMBER N/A	
				5e. TASK NUMBER N/A	
				5f. WORK UNIT NUMBER N/A	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A				10. SPONSOR/MONITOR'S ACRONYM(S) N/A	
				11. SPONSORING/MONITORING AGENCY REPORT NUMBER N/A	
12. DISTRIBUTION AVAILABILITY STATEMENT Unlimited					
13. SUPPLEMENTARY NOTES N/A					
14. ABSTRACT HEMI is currently fielded in each of the military branches of the armed forces but in a limited way that is mostly constrained to military policing type functions. The technology itself, like all non-lethal systems, is not without its risks and limitations. HEMI technology does not substitute for lethal force when that need exists; however, it does give the warfighter an ability to incapacitate without the strategic implications that occur from wrongful death or serious injury when deadly force is used. The technology has a place in any situation of uncertainty, especially in a counterinsurgency. Every individual involved in normal combat operations should be issued a HEMI system, as it can have positive use no matter the type of battlefield. HEMI technology will give our front line warrior better tools to effectively carry out their job and positively contribute to the strategic goals of the United States.					
15. SUBJECT TERMS HEMI; Human Electro-Muscular Incapacitation; NLW; Non-lethal weapons; Taser; NMI; Neuro-Muscular Incapacitation; ECD; Electronic Control Devices					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 39	19a. NAME OF RESPONSIBLE PERSON Marine Corps University / Command and Staff College
a. REPORT Unclass	b. ABSTRACT Unclass	c. THIS PAGE Unclass			19b. TELEPHONE NUMBER (Include area code) (703) 784-3330 (Admin Office)

United States Marine Corps
Command and Staff College
Marine Corps University
2076 South Street
Marine Corps Combat Development Command
Quantico, Virginia 22134-5068

MASTER OF MILITARY STUDIES

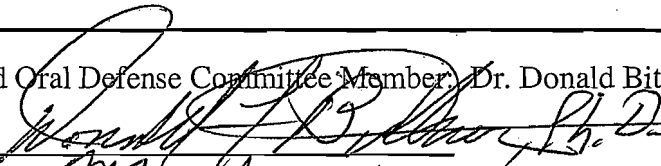
TITLE: Human Electro-Muscular Incapacitation (HEMI) Use in the Military
Applicability Across the Full Spectrum of Operations

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

AUTHOR: Major Damian Schlussel, USAF

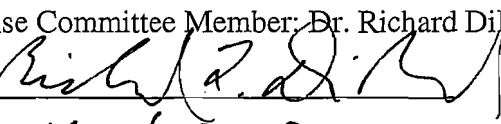
AY 09-10

Mentor and Oral Defense Committee Member: Dr. Donald Bittner, Professor of History

Approved: 

Date: 30 March 2010

Oral Defense Committee Member: Dr. Richard DiNardo, Professor of National Security Affairs

Approved: 

Date: 30 March 2010

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE COPRS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

QUOTATION FROM, ABSTRACTION FROM, OR REPRODUCTION OF ALL OR ANY PART OF THIS DOCUMENT IS PERMITTED PROVIDED PROPER ACKNOWLEDGEMENT IS MADE.

Executive Summary

Title: Human Electro-Muscular Incapacitation (HEMI) Use in the Military/Applicability Across the Full Spectrum of Operations.

Author: Major Damian Schlusell, United States Air Force

Thesis: HEMI is relevant for combat operations at the tactical level of war, but also has an impact at the operational and strategic levels in order to win the people and adhere to the nation's moral values while pursuing national interests.

Discussion: HEMI is currently fielded in each of the military branches of the armed forces but in a limited way that is mostly constrained to military policing type functions. The technology itself, like all non-lethal systems, is not without its risks and limitations. It is understood that there can be no casualty free system, and critics often criticize any use of force regardless of the outcomes. A basic Clausewitzian point emphasizes that war and conflict involve violence and, accordingly, some casualties may and will occur – the issue is avoiding excessive casualties or those of non-combatants and all of the ensuing consequences.

HEMI technology does not substitute for lethal force when that need exists; however, it does give the warfighter an ability to incapacitate without the strategic implications that occur from wrongful death or serious injury when deadly force is used. The technology has a place in any situation of uncertainty, especially in a counterinsurgency. Every individual involved in normal combat operations should be issued a HEMI system, as it can have positive use no matter the type of battlefield. HEMI technology will give the front line warrior better tools to effectively accomplish their missions and positively contribute to the strategic goals of the United States.

However, the mass issuance of an HEMI capability to military personnel is a departure from the traditional philosophy of arming the warfighter with greater lethal firepower. It will require incorporating HEMI capabilities into the equipment, training, and doctrine of the armed services. Doing so would substantially improve U.S. effectiveness in conflict and post-conflict operations.

Conclusion: In order to give a capability to incapacitate without the risk or potential strategic impact associated with lethal force, HEMI weapons systems need to be widely integrated into the use of force capabilities across the full spectrum of military operations.

Table of Contents

	Page
Preface.....	iv
Introduction.....	1
Understanding HEMI Technology and its Current Uses in the Military.....	3
Safety of HEMI Devices.....	6
HEMI's Expanded Potential in the Military Environment.....	9
Applicability to the Full Spectrum of Military Operations.....	12
Perceived HEMI Limitations.....	17
Conclusion.....	19
Appendix A: M26 and X26E Taser.....	22
Appendix B: X26 Taser.....	23
Appendix C: Taser Shotgun Round and Area Denial System.....	24
Appendix D: Taser Engagement Areas vs Other Means of Force.....	25
Appendix E: HEMI Force Continuum.....	26
Appendix F: Glossary of Terms.....	27
Bibliography & Source Information.....	28

Preface

The author is a career military police officer with twelve years of experience. For this paper, he has drawn on his background from travels and duties that have covered 17 countries, to include significant assignments in Europe and Iraq. Additionally, the author is a certified tactics and chemical agent instructor, and is a member of numerous professional organizations. The latter includes the National Tactical Officers Association, Fraternal Order of Police, Federal Bureau of Investigation National Academy Association (FBI NA Session 231), Air Force Security Forces Association, and the Air Force Association.

While reading this paper, one must not make the mistake of assuming that I am advocating for complete substitution of HEMI for lethal force. Rather, I am simply stating that it has far more applications than is currently being utilized. Additionally, like any use of force, there are risks associated with it and, in some cases, may cause death. With that being said, incorporating HEMI capabilities into the equipment, training, and doctrine of the armed services could substantially improve U.S. effectiveness in conflict and post-conflict operations. Additionally, HEMI devices would give the warfighter an effective tool to use via incapacitating force without the strategic consequences that a lethal weapon system carries with it when deadly force is used - especially when the casualties are innocent or, to choose a phrase from the late 20th century, "collateral damage."

I would like to acknowledge the following people: my wife for her love and support which allowed me to finish this project; Dr. Donald Bittner for his patience and guidance to a person who does not consider himself academically inclined; Colonel George Fenton, USMC (Retired) for his numerous mentoring sessions from the industry perspective, and Taser International for making all of their data and studies readily available to me.

Introduction

Over the last 15 years, the use of less than lethal force¹ in law enforcement, corrections, and military capacities has increasingly become a scrutinized practice. Primarily, this is due to technological advances which have allowed the mass fielding of new weapon systems, coupled with media attention and enhanced news coverage. Nearly every day in global headlines there is a news report, magazine article, or press release citing the increasing need for a capability to quell a disturbance or subdue a subject solely with the use of non-lethal or less than lethal force. Likewise, there are numerous reports linking death or serious bodily injury to many types of force, including less-than-lethal force.

The Department of Defense has deployed less-lethal technology under its Joint Nonlethal Weapons Program since 1995. During that year, civil agencies provided less-lethal weapons and equipment, technical assistance, and training to support the U.S. military's redeployment to Somalia.¹ Such technology enables U.S. forces to reduce unintended casualties and infrastructure damage during complex missions; discourage, delay, or prevent hostile action; limit escalation where lethal force is not the preferred option; protect U.S. forces; and temporarily disable equipment and facilities.²

There are a plethora of options available for less-than-lethal force. A common one which is more effective and has effectively replaced the riot control agent CS in day-to-day use, is Pepper or "OC" spray. OC spray is formally known in the military as Oleoresin Capsicum and is a lachrymatory or inflammatory agent that is used in riot control, crowd control, and personal self-defense.³ Other options include expandable batons, rubber and plastic bullets, use of military

¹The non-military term "less-than-lethal" is synonymous with the military definition of non-lethal.

working dogs (K9), light dazzlers or distracters, Long Range Acoustic Devices, and Active Denial Systems. One non-lethal technology that has specifically become a preferred choice among police departments are advanced electronic control devices that produce Neuro-Muscular Incapacitation (NMI). In the military, the term NMI is synonymous with Human Electro-Muscular Incapacitation (HEMI).

However, HEMI technology is not without its critics. Whether HEMI devices are safe and reasonable alternatives in the use of force spectrum remains a controversial topic. In a January 2005 article in the *San Francisco Chronicle*, Zian H. Tseng, MD, a Board Certified cardiovascular specialist and an expert in aspects of electrophysiology at the University Of California, stated his belief that HEMI devices were dangerous and asserted that an ill timed HEMI strike can be fatal.⁴ Even Taser International, the leading company in the development of HEMI technology, states that their technology is not risk free. Additionally, human rights advocacy groups like Amnesty International have claimed that HEMI technology can be used as a form of torture.

This and similar criticism has not swayed more than 14,000 law enforcement agencies from deploying over 406,000 HEMI devices in more than 40 countries. This resulted in an estimated 1.3 million humans being exposed to the technology at an average rate of 490 uses per day.⁵ Additionally, every state in the United States but one allows the use of HEMI systems in a Law Enforcement capacity. The sole exception, New Jersey, is currently pending state legislature endorsement. Fortunately, with the sheer numbers of organizations using this technology, much diverse data has been collected from studies and task forces. This has permitted individuals or organizations to make their own educated decisions on the safety of HEMI weapons, and whether or not they are appropriate for usage as part of the use of force continuum.

Although non-lethal weapons are in the armed forces arsenal, they are not widely integrated into the full range of operations nor have they entered the mainstream of defense thinking and procurement.⁶ Despite this, incorporating HEMI capabilities into the equipment, training, and doctrine of the armed services could substantially improve U.S. effectiveness in conflict and post-conflict operations. HEMI devices would give a warfighter a tool to use as an incapacitating force without the strategic consequences that a lethal weapon system carries with it, especially when innocent casualties occur. The contemporary media age only enhances the negative effects when such incidents occur. As a result, HEMI is relevant for combat operations at the tactical level of war, but also has an impact at the operational and strategic levels in order to win the people and ensure our moral values do not conflict with the country's national interests.

Understanding HEMI Technology and its Current Uses in the Military

It is important to understand key terms and definitions, plus the significant differences between HEMI devices and traditional less than lethal use of force options. Department of Defense Directive 3000.3 (1996) defines both Non-Lethal Weapon and Incapacitation. Non-Lethal Weapons:

- Are explicitly designed and primarily employed so as to incapacitate personnel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment.
- Are intended to have relatively reversible effects on personnel or material
- Are not required to have a zero probability of producing fatalities or permanent injuries. However, while complete avoidance of these effects is not guaranteed or expected, when properly employed, non-lethal weapons should significantly reduce

them as compared with physically destroying the same target [such as through lethal force].⁷

The Department of Defense uses two working definitions for incapacitation. One applies to lethal force while the other applies to non-lethal. These definitions are:

- Lethal perspective: The inability to perform physical to mental tasks required to be effective in a particular role.
- Less-lethal perspective: Weapon munitions effects that result in either rendering a person physically incapable (real or perceived) or mentally disinclined to resist or pose a threat to friendly forces.⁸

The main difference between HEMI and a traditional “stun” system revolves around the meaning of incapacitation. A stun system generates “electrical noise” that the sensory nervous system interprets as pain or discomfort but does not cause incapacitation.⁹ Instead, it is considered a pain compliance tool. However, a HEMI system stimulates the peripheral nervous system by causing direct stimulation of motor nerves contracting muscles. In doing so, HEMI systems affect both the sensory and motor nervous systems causing incapacitation.¹⁰

For the military specifically, HEMI systems were fielded in 2003 due to an urgent need from an operational needs statement from Army units in Iraq and Afghanistan.¹¹ The technology was originally meant to answer a need from Coalition Forces Land Component Command and several corresponding joint or combined task forces in the primary theaters of overseas operations.¹² The military bought and employed 392 M26 and X26E Tasers (Appendix A) through the Rapid Fielding Initiative as a commercial off the shelf system. As with any commercial off the shelf system, all the necessary reviews such as medical, human effects, legal, and safety were accomplished prior to fielding. Although the systems were praised for their

effectiveness, some criticism of their effective range and single shot per cartridge capacity resulted. Unfortunately, replacement Army units were not mandated to continue using the Taser devices. Instead, employment of the technology remained at the discretion of a unit's commanding officer based on his/her perceptions of its utility.

The HEMI systems currently in use by the military continue to primarily be the handheld models previously mentioned, including a newer X26 model (Appendix B). There are also HEMI shotgun rounds and area denial systems being evaluated for use (Appendix C). The handheld models (e.g. Taser X26) generally have the following characteristics (Refer to Appendix B):

- Use compressed nitrogen to shoot electrically charged probes at an attacker. When the probes connect with a target, they release up to 14 watts (about 50,000 volts) of electric pulses for up to five seconds, which incapacitate by causing the muscles to contract uncontrollably.
- Target is immobilized in less than half a second. Effects of the shock last several minutes.
- If the probes fail to hit the target, there are two stun electrodes on the front of the unit which can be used as a stun [pain compliance] device.¹³

According to Mr. Eric Niver from the U. S Army Nonlethal Scalable Effects Center, HEMI systems in the Army are mostly used by Department of the Army police and Military Police units conducting law enforcement functions in stateside bases. Additionally, units who are conducting detainee operation missions also employ this technology. Moreover, it is currently being deployed with Brigade Combat Teams and Military Police units conducting operations in overseas areas as part of their Nonlethal Capability Kits.¹⁴ The three other main services are employing HEMI systems in a similar fashion, mostly policing units or as part of

capability enhancement kits. The last service, the United States Coast Guard, only employs HEMI systems in a limited capacity in security of their ports and bases but not while actively engaged in ship borne operations.

Safety of HEMI Devices

In order to evaluate the applicability of HEMI technology in an uncertain environment and if it can substantially improve U.S. effectiveness in conflict and post-conflict operations, the safety aspects of HEMI technology must be assessed. HEMI technology appeared in the 1970s and has been the subject of over 150 studies by scores of universities, hospitals, physicians, law enforcement agencies, and military panels, as well as other independent organizations. This includes years of testing by government agencies in Canada, the United States, and other countries throughout the world.¹⁵

Although HEMI technology continues to be used, the weapon systems themselves have not been classified as an official acquisition program. As previously noted, the military HEMI systems are considered a commercial off the shelf product. The difference in terminology is simply related to funding lines and product development as the systems themselves have met all medical, human effects, legal, and safety reviews prior to fielding. The information derived from the reviews combined with a training program developed by Taser International is what helped form the Inter-service Nonlethal Individual Weapons Instructor Course manual. From this manual, it states that HEMI does not:

- damage nerve tissue;
- cause "electrocution" in a wet environment; or
- generally cause urination or defecation.¹⁶

However, use of an HEMI system is not without risk. When a HEMI device is employed as a stun weapon (to achieve pain compliance), it can indeed cause marks and burns.¹⁷ Additionally, the use of an HEMI device does have potential negative side effects which include:

- Can cause signature marks that resemble minor surface burns that can appear red or may blister from the probes;
- Probe(s) can cause eye injury;
- Can cause strong muscle contractions and cause exertion which is similar to athletic activity which may result in similar type injuries;
- Muscle contractions may pose additional risk to certain persons such as pregnant women;
- Can cause secondary injuries from person falling. Fall injuries, particularly from elevated heights, can pose risk of significant injury or death; and
- Can cause pain and associated stress.¹⁸

The leading company in the development of HEMI technology, Taser International, states that HEMI is generally a safe and effective alternative to lethal force, but it is not risk free. In making this assertion, the company draws from an extensive compendium of studies and analyses spanning local, state, federal, and international institutions, agencies, and universities. In all, over 150 independent studies have analyzed HEMI technology with favorable result.¹⁹ Overall, HEMI technology has become the most tested and analyzed non-lethal system in the military inventory and is found to be generally safe and effective.²⁰ Despite this, critics will remain and no operation weapon system can absolutely be guaranteed to be injury free.

Moreover, several cross-functional task forces and independent studies have evaluated the technology and have come to similar conclusions. A summary of these conclusions is contained below:

- Studies show the electrical charges cause no long-term damage to the target.²¹
- Real time ultrasound showed that even when electronic control device probes are placed across the chest over the human heart, the [HEMI] electrical pulses have no effect on that vital organ.²²
- There is no scientific data that suggests the use, or multiple use, of a HEMI device would result in a death or other regrettable outcome.²³
- The makers of HEMI devices say their claims of safety are backed by more than an estimated 882,000 training exposures given to law enforcement officers to date without suffering a single serious injury.²⁴
- An independent study by the Potomac Institute (2005) sponsored by the not-for-profit Public Policy Research Institute analyzed issues related to HEMI devices and brought together experts in the fields of medicine, industry, public policy, armed forces, and law enforcement. It concluded that when used appropriately, HEMI technology is relatively safe and clearly effective.²⁵
- Odds for HEMI to contribute to death are, at worst, one in one thousand (Note: this does not imply “cause”). The ratio of lives saved to lives lost exceeds 70:1. By comparison, the similar ratio for air bags in automobiles is approximately 50:1.²⁶
- While HEMI devices produce 50,000 volts to create a spark that will transmit electricity through two inches of clothing, only short pulses of 400 volts actually enter the body. The average voltage during a five-second application is less than one volt. When compared to a static shock from a doorknob (35,000 to 100,000 volts) or a Van de Graff Generator (1M to 20M volts), 400 volts with extremely low current is equally as harmless.²⁷

- The average current delivered by a HEMI device is 2.1 milliamperes. Compare this with the average Christmas tree light bulb which has approximately one ampere of current, or the 16 amps from a typical 110-volt wall socket.²⁸
- A study (2009) for the National Institute of Justice conducted by Dr. William P. Bozeman of Wake Forest University Baptist Medical Center looked at more than 1,200 cases of HEMI use from six police departments across the country from 2005 to 2008. It found that an overwhelming majority of the people exposed did not suffer serious injuries. By examining these reports, doctors determined 99.75 percent of those exposed suffered no injury or mild injuries.²⁹

As Taser International, the leading company in HEMI technology, acknowledged in a submission to the US Securities and Exchange Commission, their products “are often used in aggressive confrontations that may result in serious, permanent bodily injury or death to those involved. Our products may cause or be associated with these injuries”.³⁰ While conceding this, HEMI technology itself is designed to minimize fatalities and permanent injuries but is not risk free in every circumstance. When compared to the risk of death or serious injury from other available uses of force and taking into consideration that HEMI technology induces incapacitation, the worth from this technology outweighs any potential risk of injury.

HEMI’s Expanded Potential in the Military Environment

A modern day marksmanship axiom taught on the rifle range reads, “The most deadly thing on the battlefield is one well-aimed rifle round.” A well-aimed rifle round can yield total incapacitation as it can be instantly lethal. Yet, for HEMI to produce the same results without lethality, a strike anywhere on the body results in complete incapacitation.³¹ The graphic at Appendix D depicts this concept. However, the ranges in which HEMI technology can be employed versus the distance of conventional non-lethal or lethal munitions are significantly

more limited. The current range for HEMI weapons technology for law enforcement and military is only 15-35 feet.³² Although the ranges are less when compared to conventional non-lethal methods, HEMI devices have a 69% success rate of ending a confrontation at the first iteration compared to 65% for chemical sprays, 45% for impact weapons, 41% for takedowns, and 16% for compliance holds.³³

According to the National Tactical Officers Association National Less Lethal Statistical database and their Post Critical Incident Reports, 80% of employments occurred at a distance to the subject from 0 to 10 feet.³⁴ Most of the other employments (15%) were between 10 to 15 feet, with only 5% over 15 feet.³⁵ From a user safety perspective for the military in a combat environment, these distances are much less than ideal and may subject a service member in close quarters combat to added risk. However, when looking at the modern battlefield, the engagement distances during operations in uncertain environments such as urban terrain, jungle operations, patrolling, and similar such missions is similar to the 10 to 15 feet that was recorded in the National Tactical Officer Association information. If looking at situations where HEMI technology is already being used such as detainee operations and police training teams, the employment distance remains less than 15 feet.

An area that is advantageous for a user to employ HEMI is in the crisis decision making cycle. For the purpose of this paper, the crisis decision making cycle is an immediate or reflexive response occurring when a military member encounters a threat, especially at a short distance in an uncertain environment. In these cases, the decision to use force has to be made near instantaneously. This process is vitally important as the use of decisive force during initial contact in a confrontation appears to be the solution in ending conflict quickly and thereby statistically reducing the likelihood of additional injuries.³⁶ For military members, the rules of

engagement serve as a guide (or challenge) on how to use proportional force, to include lethal force when hostile intent is clear or imminent.³⁷ However, when it is hard to clearly discriminate between friend or foe or if there is a question on motive of the individual being encountered, the decision cycles become infinitely more complicated. As Colonel George Fenton, USMC/Ret, previous director of the Joint Non-Lethal Weapons Directorate, noted in 2009:

Snap judgments are reactive, and can very well have the wrong consequence even though the perception at the time of the event suggested lethal force to be the only option. The dilemma heightens when leaders tend to think in terms of black and white lethal or non-lethal options. Having three choices-shoot, don't shoot, or employ a nonlethal weapon-may exasperate the warfighter decision cycle and worsen his chances for successful engagement by offering too many choices or taking too much time to act.

Under such circumstance and pressures of the moment, traditional actions deploying non-lethal capabilities (NLC) may not work. Conventional NLC are intended to influence the motivational behavior of a subject through some form of pain compliance. Irritants (e.g, Riot Control Agents and malodorants), rubber bullets, bean bags, light dazzlers/distracters, and heat generators (e.g Active Denial systems) are designed to deter a subject from completing his task at hand. While these capabilities are generally successful against noncombatants or even unruly and disruptive persons, a motivated subject who just may be the enemy can fight through the pain and continue his mission. HEMI, however, is the only advanced technology system that fully incapacitates without killing. Armed with a capability that delivers

HEMI, a warfighter is able to take immediate, decisive action without hesitation or fear of unintended consequence.³⁸

In simplest terms, HEMI bridges the gap between traditional nonlethal munitions and lethal force from a firearm. Appendix E graphically depicts this concept. HEMI gives a user a tool that can incapacitate a potential adversary without the strategic consequences from misapplied lethal force.

Applicability to the Full Spectrum of Military Operations

There can be no casualty free system, and critics often criticize any use of force regardless of the outcomes. A basic Clausewitzian point emphasizes that war and conflict involve violence and, accordingly, some casualties may and will occur – the issue is avoiding excessive casualties or those of non-combatants and all of the ensuing consequences. When evaluating whether or not the military can use HEMI technology to limit injury and death, a comparison can be made to non-military units who would employ the technology in a similar manner under similar circumstances.

Police Tactical or Special Weapons And Tactics (SWAT) teams are often posed with similar high threat and uncertain environments that a military member may encounter in a combat zone, especially military operations in an urban terrain (MOUT). In urban terrain, both sets of operators, military or SWAT, may encounter people who are suicidal, heavily armed, barricaded, mentally disturbed, ideologically driven, wanted, may have hostages, or conduct other types of illicit or illegal activity such as bomb making and manufacturing drugs. Utilizing the National Tactical Officers Association National Less Lethal Statistical database and their associated Post Critical Incident Reports, the effectiveness of HEMI technology under these circumstances can be evaluated. To narrow the scope of the research results for the purpose of this paper, only one

team's documented cases between 2001 to 2008 are detailed below. Additionally, some clarifying notes on how a specific bulletized item would compare to a military application are included as applicable:

- Of 353 total incidents in which less lethal systems were used, a HEMI system was employed 180 times. Civilian tactical units have the ability to utilize similar munitions as the military such as 12 gauge and 37-40mm non-lethal impact rounds. Even though impact rounds were available, HEMI technology was still preferred for initial employment for two thirds of the recorded incidents. Additionally, the HEMI systems were employed without posing a problem to the lethal force options that were available to the teams.
- The HEMI technology was classified as "effective" in all but 19 instances. All of the failed occurrences were from 2004 or earlier, before various technological upgrades had become available (such as extended range cartridges and longer probes). Most of these 19 incidents could be characterized by poor employment which negated the effects of the technology as probes either missed the target or they did not provide a good contact point. Although major upgrades to the technology have increased the effectiveness even during poor employment, the military could expect some failures if widely employing HEMI technology in a combat zone. Such anticipated failures would be based on the assumption that no system works 100% of the time.
- Only two of these reported incidents resulted in injuries (probe penetrations that broke the skin) to a suspect as a direct result related to the employment of the HEMI technology. Employment in the full spectrum of military operations would see similar injuries at similar rates as the use of force is itself a violent act.

- There were 18 incidents that still required lethal force to be used although HEMI technology had already been employed. The deaths were not associated with the direct employment of the HEMI technology; rather, lethality occurred because of an action by a subject that forced lethal incapacitation. These types of situations would also be encountered in a conflict or post conflict area of operation for the military. Even when a HEMI technology is employed, the full spectrum of use of force options still needs to be available if a situation changes.³⁹

The military has already employed HEMI technology in limited instances in conflict and post-conflict area of operations. It has and continues to be deployed as part of nonlethal capability kits that accompany Brigade Combat Teams, some Military Police units, and Marine Expeditionary Units.⁴⁰ However, due to a lack of reporting tools and databases that capture their use, it is currently difficult to measure the effectiveness in these adverse environments. The one area where employment has produced documented reports is from detainee operations in Iraq and Afghanistan. During an eight month time period between 2004 and 2005 in Iraq, HEMI technology was employed in support of the use of force continuum in a facility or in air or ground movement convoys between various facilities.⁴¹ With over 360 uses of a HEMI system, there were only six recorded instances that required medical attention.⁴² From these six incidents, common injuries were classified as lacerations or superficial penetrations from the probes. Only one was classified as a serious injury, when a probe contacted near a subjects eye socket. All of the uses were characterized in the after-action reports as “effective” and gained the detainee’s (subjects) compliance in every scenario.⁴³

However, HEMI technology should not be limited to detainee operations or “police like” missions. Rather, it has the potential to change how the use of force is applied to the challenges associated with 21st century conflict. Warfare in the 21st century has become more complex with

the expansion of worldwide communication within increasing population numbers, the latter often occurring in unstable conditions. New abilities to gain instant access into media outlets have fueled insurgencies with real or perceived grievances which are marked by operating in urban combat environments amidst numerous non-combatants. The contemporary enemy blends in amongst the indigenous populous, and uses these “locals” to shield themselves both physically and psychologically.⁴⁴ Moreover, this enemy also uses the local population as props in their information warfare operations. As a result, the enemy has become either unrecognizable or indiscernible. Because of the growing complication of not being able to clearly discriminate between friend, neutral, or foe in an urban or rural counterinsurgency environment, the warfighter needs an edge to better slice through the fog and friction of combat. Friendly combatants can be better enabled to make a decisive decision without unintended consequence, i.e non-combatant casualties.⁴⁵ The edge that can make the difference in such settings comes in the form of HEMI technology.

When the nation’s armed forces are fighting insurgent like activities, especially within the urban environment, the pulse of progress towards stability and security must be found with the people themselves. As General David Petraeus, then Commanding General of Iraqi Coalition Forces, said, “The people are the prize.”⁴⁶ However, while the people are the prize, they can also be the opposition. This point is amplified by British General Sir Rupert Smith, a former Deputy Commander of NATO Forces. He describes modern warfare as “war amongst the people” and uses the term to denote that the ability of nations to employ force with utility has declined in the face of a new paradigm: “the reality in which the people in the streets and houses and fields - all the people, anywhere - are the battlefield. Military engagements can take place anywhere, with civilians around, against civilians, in defence of civilians. Civilians are the targets, objectives to be won, as much as an opposing force.”⁴⁷

When armed forces become engaged in this type of uncertain environment, the warfighter's aim should be to fully incapacitate his target, not destroy it with potential collateral damage, i.e non-combatant casualties.⁴⁸ Yet, if the target is misidentified and is not an enemy, a life may be taken unnecessarily with ensuing multi-faceted complications for friendly forces. Hesitation to engage, however, may jeopardize the warfighter, his unit, and his mission.⁴⁹ This dichotomy creates a hard environment in which to operate. For each time a non-combatant is killed, the likelihood rises that the family, extended family, and/or clan members are swayed to fight for the enemy to avenge the death of a loved one.⁵⁰ However, no action on the part of the soldier may pose significant threat to an individual and his/her unit.

HEMI systems are the tools to better equip a warfighter with an ability to incapacitate a suspected adversary while still maintaining the delicate balance of fostering stability. HEMI, as reviewed previously through the National Tactical Officer's Association data, can have application in the mainstream urban combat environment. It can also have a place in any situation of uncertainty, especially in a counterinsurgency. Every individual involved in normal combat operations should be issued a HEMI system, as it can have positive use no matter the type of battlefield. However, the mass issuance of an HEMI capability to military personnel is a departure from the traditional philosophy of arming the warfighter with greater lethal firepower.⁵¹ Yet, with proper education and training of how to effectively employ HEMI, warfighters can broaden the opportunities for overwhelming and decisive action - thus enabling them to better control the streets while building the stability, support, and trust they were intended to create.⁵²

HEMI technology has already been used in harsh environments to supplement the use of force continuum in combat support roles such as detainee camps. Building on this documented

success, it can be expanded to defuse escalation of force situations in other combat or combat support scenarios. Specifically, it can help mitigate two key areas of military need – counter personnel and area denial.⁵³ Col Fenton, again noted in 2009:

At check points, [HEMI] can be used to control a subject whose intention is unknown or who fails to obey the signal to halt; the same capabilities can be employed to disperse crowds scrambling with an intention to impede and hamper a street patrol or vehicle column. HEMI can be employed to arrest suspicious or fleeing non-combatants who are wanted for later questioning.⁵⁴

HEMI technology is also in compliance with the Law of War (LOW) or Law of Armed Conflict. LOW has four principles which include military necessity, distinction, proportionality, and avoiding unnecessary suffering. When a split second decision is made that necessitates the use of force, HEMI technology allows a situation to quickly be contained without an irreversible decision that accompanies lethal force. HEMI technology allows a person to be more positively and distinctly identified, after they have been subdued but not killed or seriously injured. HEMI technology provides an option beyond using lethal force or no force at all. It provides an interim step that helps minimize collateral damage (death from the use of lethal force). Lastly, the injuries or outcomes associated with HEMI technology versus the expected results from the application of lethal force helps to avoid unnecessary suffering or unintended maiming. Preventing such casualties reduces the enemy from exploiting such collateral damage in his information operations against friendly forces.

Perceived HEMI Limitations

There are several perceived limitations of HEMI technology as it would apply to the military. The first is that no controlled scientific study has been accomplished to date that could

specifically account for normal use against individuals who are agitated and drug induced by kratom or opium derived products. This is important because members of the armed forces have the ability to encounter such individuals in their everyday duties in third world countries, where these drugs are cheap and use is common place. However, these drugs affect the central nervous system, not the peripheral nervous system that cause involuntary muscular contraction. With this caveat, a HEMI device can still be effective against these types of individuals.

There are additional aspects of HEMI technology that may still need to be scientifically evaluated which could affect or delay mass issuance of HEMI technology systems into the armed forces. These aspects, especially when combined with the harsh environments in which the armed forces operate, may also contribute to the excitable delirium state an adversary may experience, include:

- Effect of HEMI on subjects with various heart defects;
- Effect of HEMI when combined with OC Pepper spray use or other forms of less-than-lethal technology such as blunt impact munitions;
- Prolonged or repeated exposure to HEMI;
- Effects of environment factors such as extremely dusty conditions (which could predicate breathing problems) combined with high heat indexes.

Although the aforementioned aspects may need additional testing, they should not be a limitation of fully introducing the technology into the armed forces. Some of these very areas in need of increased study are similar to the problems that were originally associated with the widespread use of OC Pepper spray since its introduction into use over 20 years ago...these long term studies still continue today but have not hampered military use of the technology.

Moreover, no use of force, be it lethal or non-lethal, can account for every condition that may be

encountered...the technology itself is designed to minimize fatalities and permanent injuries, not prevent them 100% of the time. As Taser acknowledges, as with any use of force tool or technique, there can be unforeseen and severe consequences and there will always be some risk involved in the use of HEMI technology.⁵⁵

Finally, a concerted effort needs to be applied to comparing the potential lives saved from HEMI to the likely outcome had lethal or other non-lethal force been applied. HEMI is not designed to replace lethal force when the latter is warranted; it only minimizes fatalities and permanent injuries when employed in appropriate situations. As detailed by the Government Accountability Office in the *Houston Chronicle*, through 2005 [HEMI technology] had over 70,000 documented employments with only 156 deaths during that time period.⁵⁶ Statistically, this is less than a 1% chance that HEMI technology may contribute to death. However, it can postulated that when a similar employment of a lethal weapon system would be used in equivalent circumstances, the death rate would be much higher. A high noncombatant death rate during a counterinsurgency or while engaging in battle in an urban or uncertain area has the potential to negatively sway public support.

Conclusion

When it comes to the use of any less-than-lethal munitions, just as with a lethal weapon system and regardless of the operating environment, it is a matter of risk acceptance versus risk reward. HEMI systems are not immune to controversy: Any weapon system can be dangerous and harmful to an individual. It is ultimately a weapon and, as such, has the potential to injure or kill a living being. It's not an all or nothing, its degrees of risk.⁵⁷ HEMI systems in particular have seen their share of controversy. Some opponents call HEMI systems torture, suggest it can easily be abused, and say the device has led to numerous deaths each year.⁵⁸ There are and

always will be critics with any use of force. However, the death rate compared to the number of reported HEMI field uses remains relatively low and this should be recognized and emphasized.⁵⁹

For the military, HEMI technology is not considered a stand-alone force.⁶⁰ As stated in the military HEMI manual, the unpredictability of tactical situations requires the instant ability to respond across the force continuum.⁶¹ As such, HEMI technology is not designed to replace lethal force when it is warranted. Instead, it is simply a tool that can be utilized when less than lethal means are appropriate or desirable for a mission. However, not utilizing HEMI technology limits the use of force options that can be employed. The net result: military members are at increased risk, mission accomplishment is endangered, and public images subjects the United States to negative strategic outcomes to potentially be dictated at the tactical level. Removing the HEMI tool will likely result in having to use other more injurious or lethal force options and these are more likely to produce injuries.⁶²

Without HEMI, the only less-than-lethal options that will be available in most cases will be OC pepper spray, expandable batons, and impact munitions. The use of OC pepper spray requires subjects to be decontaminated prior to being placed in a holding area. Additionally, the effects of the OC pepper spray can be cross contaminated to the user, thus limiting his/her effectiveness. The expandable baton does not require any decontamination; however, the force employed during proper and improper baton strikes can seriously injure subjects by breaking bones and causing deep bruising. The information operations (IO) effect that would result from these images reaching the public would have the potential to be disastrous. Public opinion of a military operation in friendly countries and the operational area could be negatively swayed. Both of the aforementioned less-than-lethal means of force also require the utilizing personnel to

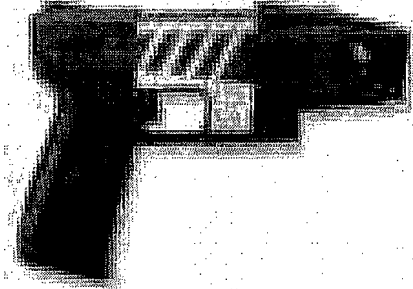
be in close physical proximity to the subject and the situation. Conversely, HEMI technology can be employed at greater distance which increases the reactionary gap that is needed for safety when attempting to resolve a situation.

There are monetary and legal concerns associated with widespread employment of HEMI technology in the military. As with any means of force, a robust training and certification program for all front line military units would have to be developed and implemented at the local level. This, along with the purchase and upkeep of the weapon system, requires fiscal considerations for the military in a continuous shrinking budget environment. Aside from budgetary concerns, there may be legal issues that will also have to be tackled. Some countries may not consider HEMI technology to be a viable use of force option. Lastly, as part of the already established military standard to track nonlethal engagements, a documented means to capture the use of the system may pose some administrative or logistical challenges.

In order to give the armed forces a capability to incapacitate without the risk or potential strategic impact associated with lethal force, HEMI weapons systems need to be widely integrated into the use of force capabilities of the full spectrum of military operations. Incorporating HEMI capabilities into the equipment, training, and doctrine of the armed services would substantially improve U.S. effectiveness in conflict and post-conflict operations once various issues associated with such weapons have been resolved. Moreover, HEMI technology will give our front line warfighter better tools to effectively carry out their job and positively contribute to the strategic goals of the United States.

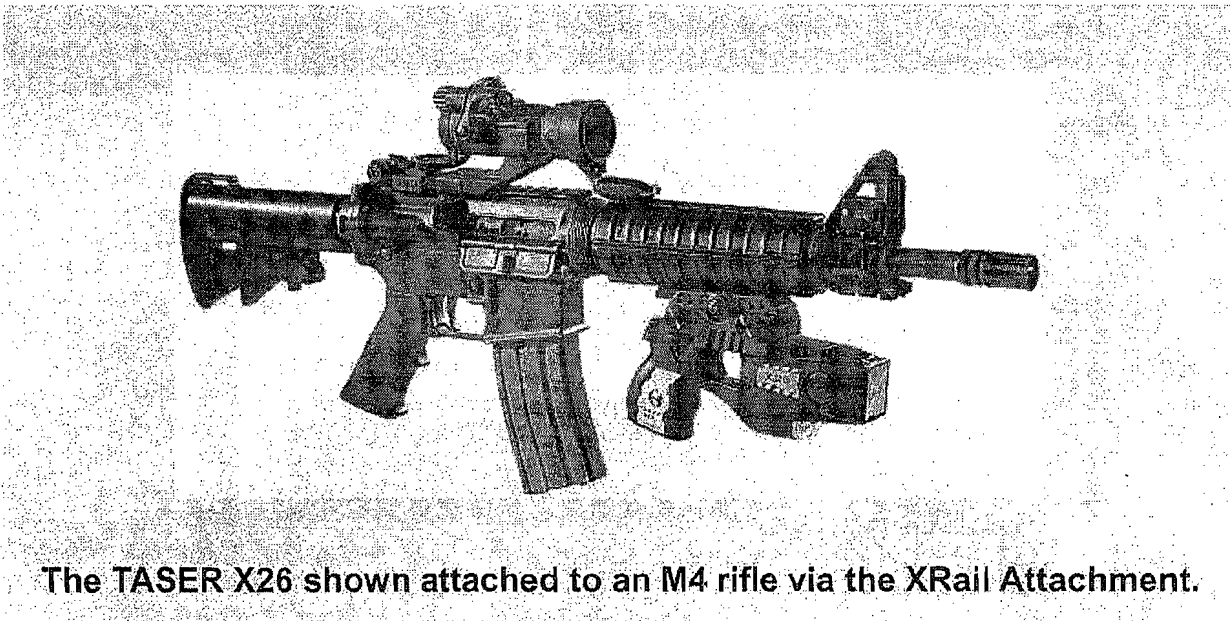
Appendix A

M 26 Taser



Note: The weapon characteristics for the M 26 are similar to those depicted in Appendix B

X26E Taser (mounted to an M4 Rifle)



The TASER X26 shown attached to an M4 rifle via the XRail Attachment.

Note: The weapons characteristics for the X26E are the same as those depicted in Appendix B

Source: www.taser.com

Appendix B

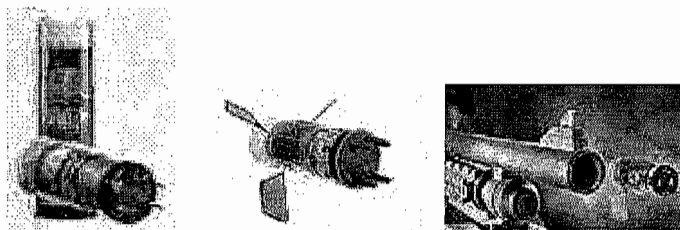
Taser X26



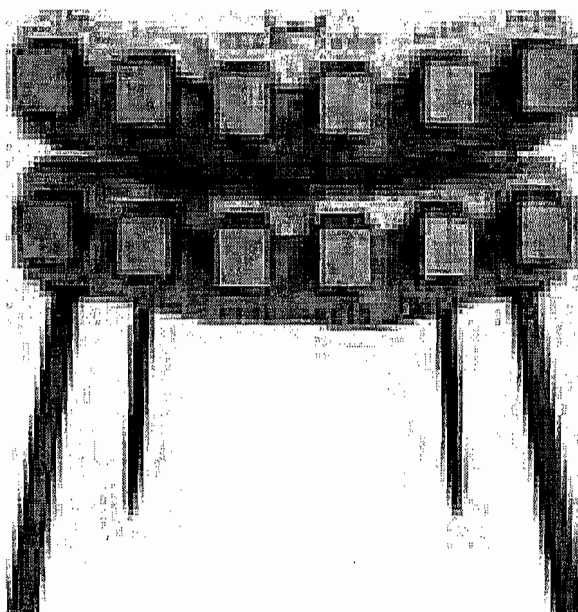
Source: www.taser.com

Appendix C

Taser Shotgun Round and Area Denial System



XREP Shotgun Round



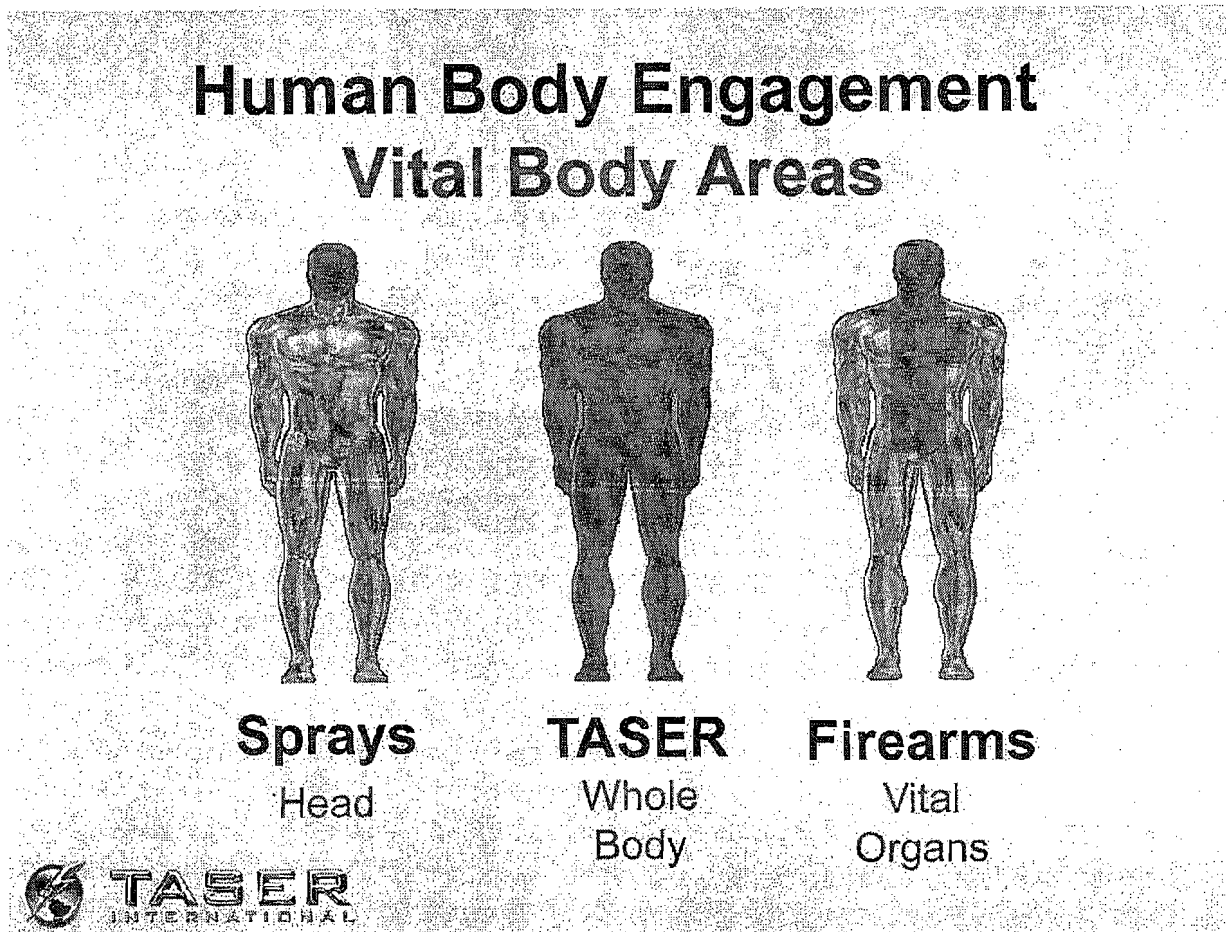
Shockwave Area Denial System

Note: Both the XREP Shotgun round and the Area Denial System utilize the same basic HEMI technology found in the X26 system, just packaged in a different form. However, these two systems have greater employment distances and ranges.

Source: www.taser.com

Appendix D

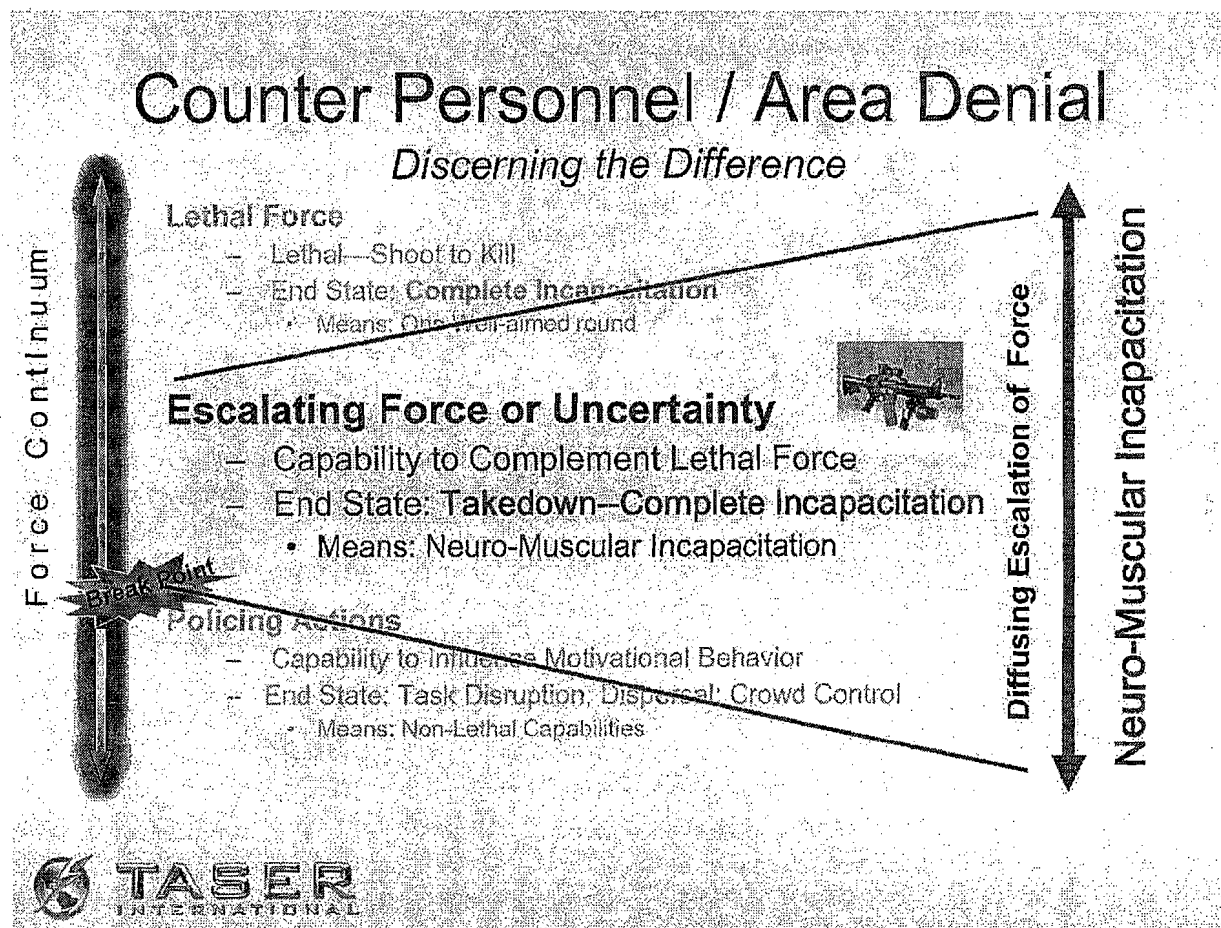
Taser Engagement Areas vs other Means of Force



Traditional aerosol sprays require them to be directed towards the head in order for them to be effective. Firearms require impacts to the vital organ area in order to achieve incapacitation in terms of death. Tasers, which are representative of HEMI technology, can be employed against any area of the body and achieve incapacitation.

Source: www.taser.com

HEMI Force Continuum



Traditional nonlethal weapon systems have their main applicability as part of policing actions inherent to security and stability operations. While the traditional systems do influence behavior, they do not provide incapacitation. In the traditional sense, incapacitation is only achieved through lethal force. However, HEMI technology bridges the gap between influencing behavior and lethal force by providing complete incapacitation and can be applied through the entire force continuum without strategic consequences.

Source: www.taser.com

Appendix F

Glossary of Terms

Active Denial System: A non-lethal counter-personnel system that utilizes Millimeter Wave Technology to create reflexive intolerable pain from non-damaging skin heat.

Distinction (in terms of the Law of Armed Conflict): According to DoDD 5100.77, *Law of War* Program, Distinction means discriminating between lawful combatant targets and noncombatant targets such as civilians, civilian property, POWs, and wounded personnel who are out of combat. The central idea of distinction is to only engage valid military targets. An indiscriminate attack is one that strikes military objectives and civilians or civilian objects without distinction. Distinction requires defenders to separate military objects from civilian objects to the maximum extent feasible.

CS (OrthoChloroBenzalMalononitrile): A white crystalline solid resembling Talcum Powder that is classified as a substance that increases the flow of tears and is a skin and respiratory irritant. 75% of the effects of this compound are psychological and as such, the following people can have a high tolerance to it and pain: Narcotics users, alcoholics, mentally ill, highly motivated, hyperactive, hysterical, or people with multiple sclerosis or muscular dystrophy.

Lachrymatory Agent: a chemical compound that irritates the eyes to cause tears, pain, and even temporary blindness

Long Range Acoustic Device (LRAD): a crowd control and acoustic hailing device.

Maleoderant: a chemical compound whose extreme stench acts as as a temporary incapacitant. It effects the olfactory nerves of the person introduced to the chemical. These compounds are usually composed of at least two ingredients: the malodorant compound and a carrier liquid.

OC (Oleoresin Capsicum): An inflammatory agent derived from the essence of cayenne or chili peppers. The effects of OC are more physiological than psychological and work well against those personnel where CS may have been ineffective.

Pain Compliance: A use of force technique or method that utilizes pain to influence or direct actions. Blunt force munitions, batons, and Mechanical Advantage Control Holds are three examples of pain compliance techniques or methods.

Bibliography (Primary Sources)

Electronic Control Device Research Index. Received from Taser International 26 October 2009. Although a research index is normally considered a secondary source, this index served as a foundation for a majority of my research. It has articles and information both for and against HEMI technology and is neutrally presented.

Fenton, George P. (2007). Neuro-Muscular Incapacitation-Diffusing Escalation of Force. Taser International, Inc. Unpublished working paper received from the author. Col Fenton has credibility as the former director of the Joint NLW Directorate. Since leaving the military, he has become the VP for Taser Military Sales. His unpublished article, parts of which have been included in professional publications, does have some inherent bias as he is pushing for his company's technology, but it is weighted with his experiences from the USMC and as the director.

Fenton, George P (2009). Giving the Warrior an Edge on the Street-Tactical Actions of Strategic Consequence. Taser International, Inc. Unpublished working paper received from the author. Col Fenton has credibility as the former director of the Joint NLW Directorate. Since leaving the military, he has become the VP for Taser Military Sales. His unpublished article, parts of which have been included in professional publications, does have some inherent bias as he is pushing for his company's technology, but it is weighted with his experiences from the USMC and as the director.

Inter-service Nonlethal Individual Weapons Instructor Course Manual (2009). Human Electro-Muscular Incapacitation. USMC. Received from Controlled Force Inc on November 24, 2009. This manual offers credibility, reliability and neutrality as it is designed to give information on HEMI systems that is required to be certified in the military.

National Institute of Justice (2004). Department of Defense Nonlethal Weapons and Equipment Review: A Research Guide for Civil law Enforcement and Corrections. The NIJ writes in a neutral manner and is presenting the data based on capabilities and limitations. The NIJ, based on their widespread experience and prior articles, is reliable and has credibility with manners that apply to law enforcement.

National Tactical Officers Association (2009). Less Lethal Database and Post Critical Incident Reports 2001-2009. Retrieved on September 5, 2009 and December 29, 2009 from www.ntoa.org. The NTOA is the national standard for SWAT and brings with it credibility and reliability. By the nature of their organization, they can have bias towards tactical teams, but the database and reports are presented in a neutral manner.

Niver, Eric, U.S Army Nonlethal Scalable Effects Center. Phone interview with author, January 20, 2010. Individual has credibility and reliability. He is biased towards NLW by the nature of his job but the interview gave information for and against the use of NLW, presented in a neutral manner.

Taser Fact Sheet and Press Packet (2009). TASER International. Retrieved on September 1, 2009 from www.taser.com. The company itself is obviously bias toward their technology but the fact sheets present technical information on HEMI operating systems.

Taser Prepared Presentation (2009). Military Application of Neuro-Muscular Incapacitation. Again, it is a bias presentation because of the company specific information. However, it builds on the findings by the Council of Foreign Relations and the Potomac Institute.

Bibliography (Secondary Sources)

Alexander, Dr. John B. "Nonlethal Weapons as Force Options for the Army." Presented to the National Research Council Board on Army Science and Technology. Los Alamos National Laboratory, 28 March 1994. Dated material and did not expound greatly on HEMI technology. But it did specifically address other nonlethal force options.

Allison, Graham and Kelley, Paul X. Nonlethal Weapons and Capabilities: Independent Task Force Report. Council on Foreign Relations, 2004. Retrieved from www.cfr.org. This was a good overview of all nonlethal weapons and their capabilities and limitations. The infancy of HEMI technology is addressed and served as a basis for information in this paper. The additional contributors to the report have credibility.

Amnesty International (2007). Amnesty International's Continuing Concerns About Taser Use. Retrieved on October 5, 2009 from www.amnestyusa.org. Biased article that is continuously updated and calls on unverifiable studies and information. Credibility is questionable but does present an opposing view to HEMI technology.

Anglin, Robert (2004). "Officers injury tied to taser." *The Arizona Republic*. Retrieved on October 9, 2009 from www.azcentral.com/arizonarepublic. Reporter presents against HEMI technology and repeatedly reports injuries related to the technology. Uses claims from Amnesty International to support article. Restates information from other sources.

Anglin, Robert (2005). "Taser jolt fractured deputies spine, jurors told." *The Arizona Republic*. Retrieved on October 9, 2009 from www.azcentral.com/arizonarepublic. Reporter presents against HEMI technology and repeatedly reports injuries related to the technology. Uses claims from Amnesty International to support article. Restates information from other sources.

Aragon, Arthur J. "Nonlethal Capabilities of the Future." *Military Police* 3:16-18 April 2003. Good information article from a magazine that has credibility but does present information in a biased manner.

Barrett, Benjamin K., LtCol, USA. The Utility of Non-Lethal Weapons in large-Scale Conflict. Newport, RI, Naval War College, February 2000. Unpublished Thesis. As an unpublished thesis from a military member, it did have credibility and used a wide ranging array of data.

Callihan, W.M., LtCol, USN. Non-Lethal Weapons in Conventional Combat Operations: Leveraging Capabilities or Violating the Rules of War? Newport, RI, Naval War College, 1999. Unpublished Thesis. Dated but still applicable material. As an unpublished thesis from a military member, it did have credibility and used a wide ranging array of data.

Charlie Mesloh, Mark Henych, Ross Wolf (2008). Less Lethal Weapon Effectiveness, Use of Force and Suspect & Officer Injuries: A Five-Year Analysis. Florida Gulf Coast University Weapons and Equipment Research Institute. Retrieved on 03 January, 2010 from www.ncjrs.gov/pdffiles1/nij/grants/224081.pdf. This study specifically addressed the safety of

HEMI technology which proved many earlier reports and claims to be false. It encompassed data from a wide set of uses, environments and sources. The information was presented in a neutral manner, letting the data present itself.

Council on Foreign Relations (2004). Lack of Nonlethal Weapons Capabilities Hindering U.S. Efforts in Postwar Iraq; Experts Urge Department of Defense to Increase Spending Seven-Fold. Retrieved on 28 December, 2009 from www.cfr.org. This paper specifically addressed the gap in nonlethal weapon capabilities and how this is hurting the United States strategically to win the hearts and minds. The ideas presented in this paper go hand-in-hand with the underlying tone of the paper. Because of the personnel that represented the panel, it has great credibility and is written in an objective manner. Many of the panel members have intimate knowledge, because of their position, of the capabilities of NLW.

Czech, Ted (2009). Taser Fatalities Studied. Daily Record. Retrieved from ydr.com on 29 December 2009. Resates information presented in other articles.

DOD Directive 3000.3 (1996). "Policy for Non-Lethal Weapons". Credible and reliable document. It is designed to be written as a neutral document and is used for definitions according to the Department of Defense.

Government Accountability Office Report. Safety of Taser Devices. Partially reprinted in the *Houston Chronicle*. October 31, 2006. Retrieved on October 9, 2009 from cgagte.leo.gov. GAO does have reliability and presented their report in a neutral manner.

Hamilton, Charles A., LtCol, USA. Policy Implications of Non-Lethal Weapons. Carlisle Barracks, PA, U.S. Army War College, 2002. Unpublished Thesis. Reviewed but information not used.

Hertog, Mary Kay, LtCol, USAF. Nonlethal Weapons and their Role in Military Police Missions. Future Fact or Fantasy?. Maxwell AFB, AL, US Air War College, 1996. Unpublished. Dated but still applicable material. As an unpublished thesis from a military member, it did have credibility, reliability and used a wide ranging array of data. Only portions of her thesis were reviewed. This author became the Director of USAF Security Forces and is currently a Major General.

Jett, Monty. Chemical Agents Instructors Course Manual. FBI National Academy, Quantico VA (2007). The author is the subject matter expert for the FBI. The only portions of this manual that were used applied to information on nonlethal chemical agents.

Kung, Jerry J., Maj, USMC. Non-Lethal Weapons in Noncombatant Evacuation Operations. Monterey, CA, Naval Postgraduate School, 22 March 2000. Unpublished student thesis. As an unpublished thesis from a military member, it did have credibility and used a wide ranging array of data. However, it only provided some background information and ideas for this paper.

Linder, James B, Maj, USA. "Non-Lethal Weapons : Direct Employment Against Non-Combatants in MOOTW." Unpublished student thesis, US Naval War College, June 1995. Dated but still applicable material. As an unpublished thesis from a military member, it did have credibility and used a wide ranging array of data. Ideas can be found in numerous other sources.

- Mandel, Robert. *Security, Strategy, and the Quest for Bloodless War*. Boulder, CO, Lynne Rienner, 2004. Reviewed article but information not used.
- McNulty, J.F (2000). *Remote Controlled Non-Lethal Weapons Applications*. Retrieved on 14 Sept, 2009 from the Homeland Security Digital Library. Reviewed but direct information not used.
- Meyer, Greg. "Nonlethal Weapons vs. Conventional Police Tactics: Assessing Injuries and Liabilities." *The Police Chief*, August 1992, PP 10-17. Dated material that has been updated by other sources.
- Norbut, Gerald L., LtCol, USN. *Non-Lethal Weapons: Force Enabler For the Operational Commander Conducting Peace Operations*. Newport, RI, Naval War College, February 5, 2001. Unpublished student thesis. Good information for one aspect of warfare. As an unpublished thesis from a military member, it did have credibility and used a wide ranging array of data.
- Nutley, Eric L. *Non Lethal Weapons: Setting our Phasers on Stun? Potential Strategic Blessings and Curses of Non Lethal Weapons on the Battlefield*. Maxwell AFB, AL Air University, 2003. Information has been updated but was mostly related to Air deliverable NLW.
- Potomac Institute (2005). *Efficacy and Safety of Electrical Stun Devices*. Retrieved on September 18, 2009 from www.PotomacInstitute.org. The institute has written credibly and reliably in the past and offers views in a neutral manner. The data itself that was evaluated is considered a secondary source, but the review done was from a source outside of the industry.
- Russel, Sabin (2005). "Heart expert warns about using tasers." *San Francisco Chronicle*. Retrieved on October 9, 2009 from www.sfgate.com. Article may have been proved false by recent findings (Taser News Release 2008) but the Doctor referred does have credibility based on his profession. Still used as an example of concerns over HEMI devices.
- Schluskel, Damian (2005). *A Study of Taser Employment, Subject Compliance and Subject Injury*. FBI National Academy. Unpublished academic research paper. All the data looked at in this unpublished paper was a compilation from other open sources which makes it a secondary source. However, what made this a primary source was the first hand knowledge and access to HEMI data from detainee operations. There is some bias in the paper but still present's advocate and opponent information.
- Smith, General Sir Rupert (2005). *The Utility of Force*. Allen Lane. Used work solely for a comparison of how modern warfare is defined and only look at the applicable sections. Author does have credibility and reliability based on his military positions and attempts to present information in a neutral manner but is biased based off his experiences.
- Taser News Release. *Ground-Breaking Human Study on the Effects of TASER Electronic Control Devices Published in Peer-Reviewed Journal of the Society of Academic Emergency Medicine*. August 25, 2008. Information proved previous claims about HEMI technology to be false. However, company releasing the information on the study does have bias based off the nature of their company.

Toledo Blade. Taser-Linked Death Ruled a Homicide in Toledo, Ohio. April 14, 2005.
Retrieved on September 29, 2009 from cgate.leo.gov. Article reviewed but not used.

Tuttle, Steve (2005). Estimated Lives Saved with TASER Devices Passes 9,000 Mark. TASER International. Retrieved on October, 2009 from www.taser.com. Article and press release served as an information marker on the safety of the devices. Author is obviously biased based on the employer.

Endnotes

- ¹ National Institute of Justice (2004). Department of Defense Nonlethal Weapons and Equipment Review: A Research Guide for Civil Law Enforcement and Corrections, 8
- ² National Institute of Justice, 8
- ³ Jett, Monty. Chemical Agents Instructors Course Manual. FBI National Academy, Quantico VA (2007), 32
- ⁴ Russel, Sabin (2005). "Heart expert warns about using tasers." *San Francisco Chronicle*. Retrieved on October 9, 2009 from www.sfgate.com, 1
- ⁵ Taser Fact Sheet and Press Packet (2009). TASER International. Retrieved on September 1, 2009 from www.taser.com, 3. Cited hereafter as Taser Fact Sheet.
- ⁶ Council on Foreign Relations (2004). Lack of Nonlethal Weapons Capabilities Hindering U.S. Efforts in Postwar Iraq; Experts Urge Department of Defense to Increase Spending Seven-Fold. Retrieved on 28 December, 2009 from www.cfr.org, 1
- ⁷ DOD Directive 3000.3 (1996). "Policy for Non-Lethal Weapons", 4
- ⁸ Fenton, George P. (2007). Neuro-Muscular Incapacitation-Diffusing Escalation of Force. Taser International, Inc., 2. Cited hereafter as Fenton (2007)
- ⁹ Inter-service Nonlethal Individual Weapons Instructor Course Manual (2009). Human Electro-Muscular Incapacitation. USMC. Received from Controlled Force Inc on November 24, 2009., 4. Cited hereafter as INIWIC Manual.
- ¹⁰ INIWIC Manual, 4
- ¹¹ INIWIC Manual, 5
- ¹² INIWIC Manual, 5
- ¹³ Taser Fact Sheet, 6
- ¹⁴ Niver, Eric. US Army Nonlethal Scalable Effects Center telephone interview
- ¹⁵ Taser Fact Sheet, 5
- ¹⁶ INIWIC Manual, 4
- ¹⁷ INIWIC Manual, 4
- ¹⁸ INIWIC Manual, 5-6
- ¹⁹ Taser Fact Sheet, 2
- ²⁰ Taser Fact Sheet, 2
- ²¹ Taser News Release. Ground-Breaking Human Study on the Effects of TASER Electronic Control Devices Published in Peer-Reviewed Journal of the Society of Academic Emergency Medicine. August 25, 2008, 1
- ²² Charlie Mesloh, Mark Henych, Ross Wolf (2008). Less Lethal Weapon Effectiveness, Use of Force and Suspect & Officer Injuries: A Five-Year Analysis. Florida Gulf Coast University Weapons and Equipment Research Institute. Retrieved on 03 January, 2010 from www.ncjrs.gov/pdffiles1/nij/grants/224081.pdf, 1
- ²³ Taser Fact Sheet, 7
- ²⁴ Taser Fact Sheet, 2
- ²⁵ Potomac Institute (2005). Efficacy and Safety of Electrical Stun Devices. Retrieved on September 18, 2009 from www.PotomacInstitute.org, 1
- ²⁶ Potomac Institute, 2
- ²⁷ Taser Fact Sheet, 6
- ²⁸ Taser Fact Sheet, 6
- ²⁹ Czech, Ted (2009). Taser Fatalities Studied. Daily Record. Retrieved from ydr.com on 29 December 2009, 2

-
- ³⁰ Taser Press Release, 1
- ³¹ Fenton (2007), 2
- ³² Taser Fact Sheet, 8
- ³³ Charlie Mesloh, 3
- ³⁴ National Tactical Officers Association (2009). Less Lethal Database and Post Critical Incident Reports 2001-2009. Retrieved on September 5, 2009 and December 29, 2009 from www.ntoa.org, Index 1-353. Cited hereafter as NTOA.
- ³⁵ NTOA, Index 1-353
- ³⁶ Charlie Mesloh, 2
- ³⁷ Fenton, George P (2009). Giving the Warrior an Edge on the Street-Tactical Actions of Strategic Consequence. Taser International Inc, 2. Cited hereafter as Fenton (2009).
- ³⁸ Fenton (2009), 3. Author's emphasis.
- ³⁹ NTOA, Index 1-353
- ⁴⁰ Niver, US Army Nonlethal Scalable Effects Center, Telephone Interview
- ⁴¹ Schluskel, Damian (2005). A Study of Taser Employment, Subject Compliance and Subject Injury. FBI National Academy, 12
- ⁴² Schluskel, 12
- ⁴³ Schluskel, 12
- ⁴⁴ Fenton (2009), 1
- ⁴⁵ Fenton (2009), 1
- ⁴⁶ Fenton (2007), as cited from The Washington Post, General May See Early Success in Iraq, by Thomas E. Ricks, Page A1, dated 23 January 2007
- ⁴⁷ Smith, General Sir Rupert (2005). *The Utility of Force*. Allen Lane.
- ⁴⁸ Fenton (2009), 1
- ⁴⁹ Fenton (2009), 2
- ⁵⁰ Fenton (2009), 2
- ⁵¹ Fenton (2009), 1
- ⁵² Fenton (2009), 2
- ⁵³ Fenton (2007), 3
- ⁵⁴ Fenton (2009), 3
- ⁵⁵ Taser Fact Sheet, 1
- ⁵⁶ Government Accountability Office Report. Safety of Taser Devices. Partially reprinted in the *Houston Chronicle*. October 31, 2006. Retrieved on October 9, 2009 from cgagte.leo.gov, 2
- ⁵⁷ Czech, 2-3
- ⁵⁸ Czech, 1
- ⁵⁹ Czech, 3
- ⁶⁰ INIWIC Manual, 16
- ⁶¹ INIWIC Manual, 17
- ⁶² Czech, 2